



STO AG

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**Agrément
Certificate
No 95/3132**

Designated by Government
to issue
European Technical
Approvals

STO EXTERNAL WALL INSULATION SYSTEMS

Système d'isolation pour murs extérieurs
Wärmedämmung für Außenwand

Product



• THIS CERTIFICATE EXTENDS AND REPLACES CERTIFICATES Nos 90/2433/C AND 90/2460/C AND RELATES TO STO EXTERNAL WALL INSULATION SYSTEMS.

• The systems are manufactured and designed by STO AG in Germany and are imported and marketed by CCS Scotseal Ltd, Unit 3, Lyon Road, Linwood Industrial Estate, Paisley, Renfrewshire PA3 3BQ.

Tel: 01505 324262
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• See the appendix for system summary.

These Front Sheets must be read in conjunction with the relevant accompanying Detail Sheets, which provide information specific to insulation systems.

Building Regulations — Detail Sheet 1

1 The Building Regulations 1991 (as amended 1994) (England and Wales)



The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of external wall insulation with the Building Regulations. In the opinion of the BBA, Sto External Wall Insulation Systems, if used in accordance with the provisions of this Certificate, will meet the relevant requirements.

Requirement: B4(1)	External fire spread
Comment:	The systems are classified Class 0 and therefore meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Requirement: C4	Resistance to weather and ground moisture
Comment:	Walls insulated with the systems will meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Requirement: L1	Conservation of fuel and power
Comment:	The systems will enable, or contribute towards enabling, a wall to meet the U value requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Requirement: Regulation 7	Materials and workmanship
Comment:	The systems are acceptable. See the marked sections of the appropriate accompanying Detail Sheets.

(continued on page 2)

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- The systems comprise insulation material with reinforcement and synthetic resin renders.
- The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for use on new or existing buildings.
- Application must be carried out by trained operatives strictly in accordance with the marketing company's instructions and this Certificate.

2 The Building Standards (Scotland) Regulations 1990 (as amended)



In the opinion of the BBA, Sto External Wall Insulation Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and Technical Standards as listed below.

Regulation:	1	Fitness of materials
Standards:	B2.1 and B2.2	Selection and use of materials and components
Comment:		The systems are acceptable.
Regulation:	12	Structural fire precautions
Standard:	D2.3	Non-combustibility
Comment:		The use of the systems may be restricted by this Standard in some instances but see the marked sections of the appropriate accompanying Detail Sheets.
Standard:	D2.4	External Wall Claddings
Comment:		The systems have a Class 0 surface and are unrestricted by this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	17	Preparation of sites and resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		Walls insulated with the systems will satisfy this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	22	Conservation of fuel and power
Standard:	J2.3	Elemental approach (Method 1)
Comment:		The systems will enable, or contribute towards enabling, a wall to meet this Standard. See the marked sections of the appropriate accompanying Detail Sheets.

3 The Building Regulations (Northern Ireland) 1994



In the opinion of the BBA, Sto External Wall Insulation Systems, if used in accordance with the provisions of this Certificate, will satisfy the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are acceptable. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	C5	Resistance to ground moisture and weather
Comment:		Walls insulated with the systems will satisfy this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	E8	External walls
Comment:		The systems have a Class 0 surface and can satisfy this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	F2	Conservation of fuel and power
Comment:		The systems will enable, or contribute towards enabling, a wall to meet this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.

Design Data

4 General

4.1 When installed in accordance with this Certificate, Sto External Wall Insulation Systems are effective in reducing the thermal transmittance (U value) of the walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the systems.

4.2 The systems will improve the weather resistance of a wall and provide a decorative finish. However, they may only be installed where

there are no signs of dampness on the inner surface of the wall, other than those caused by condensation.

4.3 Existing buildings subject to the Building Regulations 1991 (as amended 1994) (England and Wales), the Building Standards (Scotland) Regulations 1990 (as amended) or the Building Regulations (Northern Ireland) 1994 should have wall surfaces in accordance with the relevant sections of the Detail Sheets.

4.4 New buildings subject to the Building Regulations 1991 (as amended 1994) (England and Wales), the Building Standards (Scotland) Regulations 1990 (as amended) or the Building Regulations (Northern Ireland) 1994 should be constructed in accordance with the relevant

recommendations of BS 5628 : Part 3 : 1985. In particular Clause 21 of the Code of practice *Exclusion of moisture* should be followed in that the designer should select a construction appropriate to the local wind-driven rain index paying due regard to the design detailing, workmanship and materials to be used. The relevant recommendation of Section 3 of BS 5390 : 1976(1984) should be followed where the walls incorporate stone or cast stone.

4.5 Other new buildings not subject to any of the above should also be built in accordance with BS 5628 : Part 3 : 1985 and/or BS 5390 : 1976(1984).

5 Moisture penetration

Tests and site examinations show that Sto External Wall Insulation Systems will resist the passage of moisture.

6 Risk of interstitial condensation

6.1 The components of the systems have a water vapour resistance such that, under the adverse conditions likely to be found in dwellings in the United Kingdom, interstitial condensation should not occur within the insulation.

6.2 If a system is to be used on the external walls of rooms expected to have continuous high humidities, care must be taken in the design of the rooms to avoid possible problems from the formation of interstitial condensation in the wall.

7 Maintenance

7.1 Regular checks should be made on the installed system, particularly at joints with other elements, to ensure that ingress of water does not occur. Necessary repairs should be effected immediately.

7.2 Damaged areas must be repaired using the appropriate Sto components and the procedures detailed in the Sto AG Information Manual.

8 Durability



8.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1982 indicate that the systems are durable. They should remain effective for at least 30 years, provided that any accidental damage to the surface finish is repaired immediately, and that regular maintenance checks are made on joints in the systems and on external plumbing fittings to prevent leakage of rainwater into the systems.

8.2 The finishes may become soiled in time, the rate depending on the locality. The appearance can be restored by a powerwash at 30 bar maximum pressure and 30°C maximum temperature or, if

required, by the application of a further finish of paint, but great care must be taken not to adversely affect the water vapour transmission characteristics of the systems.

8.3 Tests conducted by the BBA indicate that when the standard reinforcing mesh is used in situations where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level, the Sto systems have adequate resistance to possible damage. In other situations, eg walls of public buildings at ground-floor level, the combined heavy duty and standard reinforcing meshes are required to increase the resistance to impact. Guidance may be obtained from BRE Current Paper CP 6 : 81 *Assessment of external walls — Hard body Impact Resistance* and STO AG or CCS Scotseal Ltd.

Installation

9 Approved installers

9.1 Application of the systems, within the context of this Certificate, is carried out by approved installers; an approved installer being a firm which:

(1) is employing operatives who have been trained and approved by Sto AG or CCS Scotseal Ltd to install the systems and who have been issued with appropriate training cards by STO AG or CCS Scotseal Ltd

(2) has undertaken to comply with STO AG's or CCS Scotseal Ltd's application procedure, which contains the requirement for each application team to include at least one member with a training card, and

(3) is subject to supervision by STO AG or CCS Scotseal Ltd, including site inspections.

9.2 Firms may also be approved to install the systems under the BBA's Assessment and Surveillance Scheme for Installers of External Wall Insulation Systems. In addition to the requirements given in section 9.1, these installers will be subject to site and office inspections by the BBA prior to approval and while they remain approved.

Bibliography

BS 5390 : 1976(1984) *Code of practice for stone masonry*

BS 5628 *Code of practice for use of masonry*
Part 3 : 1985 *Materials and components, design and workmanship*

Conditions of Certification

10 Conditions

10.1 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

10.2 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided:

- (a) the specification of the product is unchanged; and
- (b) the manufacturer continues to have the product checked by the BBA.

10.3 This Certificate will apply only to the product that is installed, used and maintained as set out in this Certificate.

10.4 In granting this Certificate, the BBA makes no representation as to:

- (a) the presence or absence of patent or similar rights subsisting in the product; and
- (b) the legal right of STO AG or CCS Scotseal Ltd to market, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

10.5 It should be noted that any recommendations relating to the safe use of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the use of this product.



In the opinion of the British Board of Agrément, Sto External Wall Insulation Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 95/3132 is accordingly awarded to STO AG.

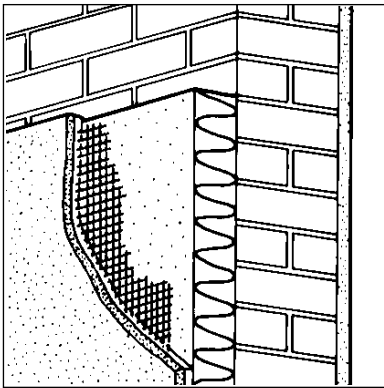
On behalf of the British Board of Agrément

Date of issue: 19th October 1995

P. Q. Newson
Director


STO AG
Certificate No 95/3132
DETAIL SHEET 2
THE STOTHERM CLASSIC EXTERNAL WALL INSULATION SYSTEM

Product



• THIS DETAIL SHEET RELATES TO THE STOTHERM CLASSIC EXTERNAL WALL INSULATION SYSTEM, A SYSTEM EMPLOYING EXPANDED POLYSTYRENE INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.

- The system is applied to the outside of external walls of masonry, dense, or no-fines concrete construction and is suitable for new or existing buildings.
- It is essential that the Sto system is installed and maintained in accordance with the conditions set out in the Design Data and Installation parts of this Certificate.
- See the Appendix for system summary.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The StoTherm Classic External Wall Insulation System (see Figure 1) comprises:

- (1) Sto Mechanical System — a PVC-U track system comprising horizontal starter and holding tracks 2.5 m long, and vertical T-splines 0.495 m long. Starter and holding tracks are fastened to substrates with Sto approved hammer-drive screws.
- (2) Sto Adhesive System — Levell-Uni — a polymer-based powder containing cement which, when mixed with clean water, can be used as an adhesive.
- (3) Sto approved Expanded Polystyrene Insulation Boards — in the sizes and density shown below and incorporating a flame retardant additive. Each pack is marked with the manufacturer's name and each board with a coloured stripe indicating the density and FRA quality:

density (kgm^{-3})	14 to 17 ⁽¹⁾
<i>Mechanical system</i>	
size (mm)	500 × 500
thickness (mm)	40 to 150
<i>Adhesive system</i>	
size (mm)	1000 × 500
thickness (mm)	20 to 200

(1) Boards of density 30 kgm^{-3} may be used at ground-floor level.
- (4) Sto Reinforcement Mesh — a 1 m wide mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating and weighing approximately 150 gm^{-2} .
- (5) Sto Armor Mat — used with and having the same specification as Sto Reinforcement Mesh but weighing approximately 490 gm^{-2} .

(6) Sto RFP — a ready mixed, cement-free, polymer based ground coat plaster.

(7) Sto Stolit — a ready mixed, acrylic based, textured coating.

(8) Sto Silco — a ready mixed, silicone based, textured coating.

(9) Sto Silco MP — a ready mixed, silicone based, textured coating or receiver for dry dash finish.

(10) Sto Dash Finish — a spar-dash aggregate (3 mm to 6 mm) for use with Sto Silco MP.

(11) Sto Maxicryl, Crylan, Silco Color and Jumbo Sil — acrylic/silicone based paint available in a range of colours.

(12) Ancillary materials:

Stoplex W sealer

StoPrim Micro sealer

aluminium starter track

PVC-U starter track

PVC mesh angle bead

Sto detail mesh

Armor angle

expansion joint profile type E

expansion joint profile type V

Stoseal tape

PU foam filler

Sto Decoprofiles (recycled glass profiles for window details)

Sto Color Royal (acrylic-based paint for use with STO Decoprofiles)

Sto Flexyl Adhesive for Decoprofiles

SS hammer drive fixings

Spit ISO fixings

Sto Thermo Dowels

Sto dowels

self-drill/Buildex SS-type screw

PVC packing shims
Sto Primer
Sto Fungal
RFP accelerator
mineral fibre fire-break slabs
Sto F500 sealant.

1.2 Sto EPS insulation boards are fixed to the external surface of the wall using the Sto Track System or the Sto Levell-Uni adhesive. The insulation boards are protected by a 4 mm Sto RFP base coat containing a glass-fibre reinforcement mesh. After allowing the base coat to dry, Sto Stolit, Silco or Silco MP is applied in thicknesses from 1.5 mm to 6 mm. Sto paints are applied as required, for features. Where a Sto Dash Finish is required, it can only be applied to Sto Silco MP applied in a thickness of between 5 mm and 6 mm.

1.3 On substrates of no-fines concrete, the insulation boards are fixed using either the Sto Mechanical System or the Sto adhesive system with supplementary mechanical fixings applied where required.

1.4 All components are subject to routine factory quality control.

2 Delivery and site handling

2.1 Sto insulation boards are delivered to site shrink-wrapped in polythene. Each pack bears the manufacturer's name and product identification.

2.2 The insulation boards must be protected from prolonged exposure to sunlight either by storing opened packs under cover or re-covering with opaque polythene sheeting. Insulation boards must not come into contact with solvents or materials containing volatile organic components such as coal tar, pitch, timber newly treated with creosote, etc. The insulation boards must not be exposed to open flame or other ignition sources.

2.3 Sto RFP, Silco, Stolit and Silco MP are supplied in 25 kg plastic pails bearing the product identification and batch numbers. They should be protected from excessive heat and frost.

2.4 Sto Levell-Uni is supplied in 25 kg triple-lined bags and should be stored in dry conditions, off the ground, and protected from moisture.

2.5 The reinforcing meshes are supplied in 1 m wide rolls in lengths of:

Sto Reinforcement Mesh	50 m
Sto Armor Mat	25 m

Design Data

3 Strength and stability

3.1 The StoTherm Classic External Wall Insulation System has adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious, precautions may be

required to reduce the risk of damage (see section 8.3 of the Front Sheets).

3.2 The system as specified in this Detail Sheet can be designed to withstand the thermal stresses and wind pressures (including suction) normally experienced in the United Kingdom. The system can also be designed in accordance with CP 3 : Chapter V : Part 2 : 1972 to withstand the increased wind loads associated with tall buildings (greater than 12 metres) and areas of high exposure. This may require the use of additional track fastenings or, where the system is adhesively fixed, the addition of mechanical fixings.

4 Properties in relation to fire



4.1 The system would not be classified non-combustible when tested in accordance with BS 476 : Part 4 : 1970(1984). However, in the opinion of the BBA, the use of the system will not introduce an additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as defined in paragraph A12 of Approved Document B to the Building Regulations 1991 (as amended 1994) (England and Wales), the Appendix to Part D of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended) and Section 2.4 of Technical Booklet E to the Building Regulations (Northern Ireland) 1994.

4.3 The behaviour in fire of external wall insulation systems is the subject of recommendations by the Building Research Establishment which, for the system, makes no restriction on the height of the building to be treated provided fire barriers are included at every floor level above the third storey.

5 Proximity of flues

5.1 When the system is installed in close proximity to certain flue pipes, the following provisions should be met:

(1) In buildings subject to the Building Regulations 1991 (as amended 1994) (England and Wales), Approved Document J, clauses 2.9, 2.15, 2.17 and 2.22 for solid fuel burning appliances, paragraphs 3.10, 3.16 and 3.20 for gas burning appliances, and paragraphs 4.7, 4.8 and 4.11 for oil burning appliances.

(2) In buildings subject to Building Standards (Scotland) Regulations 1990 (as amended), Technical Standards F3 for solid fuel burning appliances, F4 for oil burning appliances, and F5 for gas fired appliances, for compliance with these Regulations.


(3) In buildings subject to the Building Regulations (Northern Ireland) 1994, Technical Booklet L, paragraphs 2.9, 2.15, 2.17 and 2.22 for solid fuel burning appliances, paragraphs 3.10, 3.17 and 3.21 for gas fired appliances, and paragraphs 4.7, 4.8 and 4.11 for oil burning appliances.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or

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other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as $0.037 \text{ Wm}^{-1}\text{K}^{-1}$.


 6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in:

Approved Document L1 (1995 Edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), or

Part J of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended), or

Technical Booklet F to the Building Regulations (Northern Ireland) 1994.

6.3 In these documents guidance is also given on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are described which allow for some flexibility in design of U values for individual constructional elements.

 6.4 For constructions subject to the Building Regulations 1991 (as amended 1994) (England and Wales) the effect of thermal bridging should be taken into account in any U value calculations.

6.5 Where insulation boards have not been continued into window or door reveals due to a lack of clearance, there will be a risk of cold bridging at these points. Where door and window frames are to be replaced, it is recommended that their size be adjusted to permit the reveals to be insulated.

6.6 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulations should continue over the wall head. Care should be taken to ensure that ventilation openings are not obstructed.

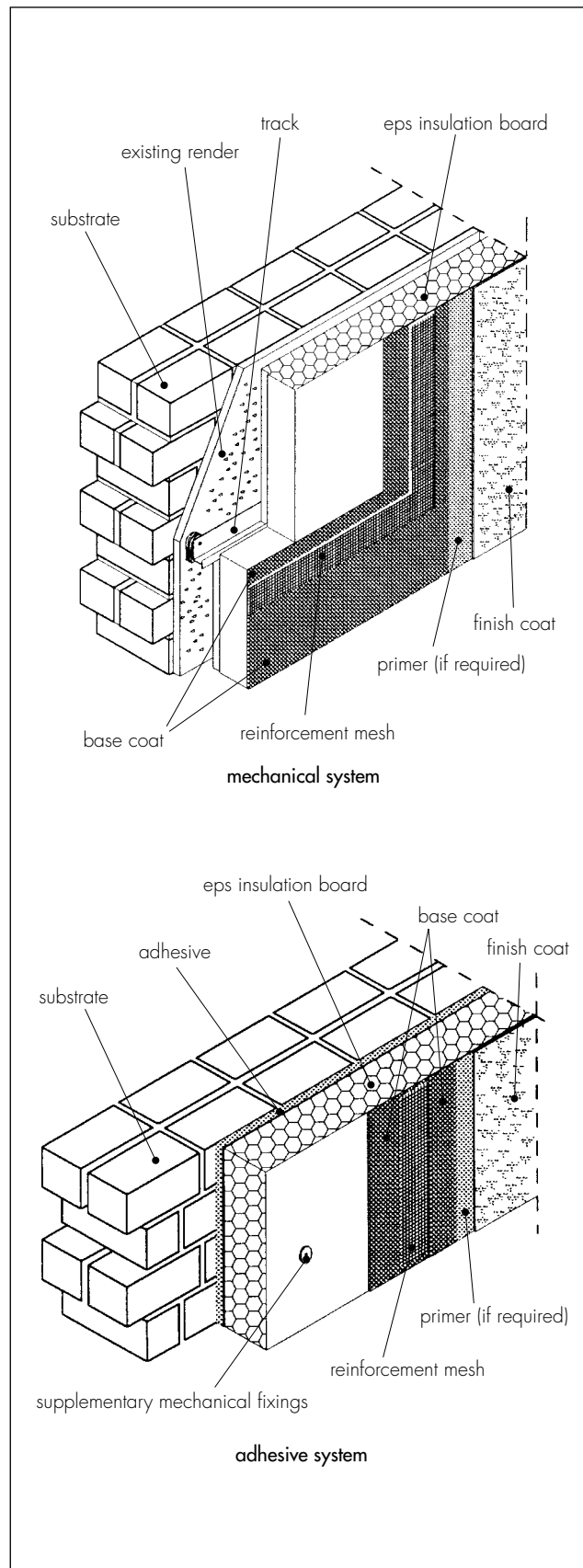
Installation

7 Site survey and preliminary work

7.1 A pre-installation survey of the property is carried out to determine suitability for treatment and necessary repairs to the building structure. The survey should include tests and an assessment and recommendation on the type and number of fastenings required in respect of the building's expected wind loading. A specification is prepared for each elevation of the building indicating:

- position of tracks (for track system)
- position of starter profile or starter mesh (for adhesively fixed system)
- reinforcing mesh(es)
- detailing around windows, doors and at eaves
- dpc level
- exact position of expansion joints, if required

Figure 1 StoTherm Classic External Wall Insulation System



areas where flexible sealants must be used
alterations required to external plumbing
position of fire barriers.

7.2 All necessary repairs to the building structure are completed before installation of the system is started.

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7.3 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked and any excessive irregularities made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

7.4 Where surfaces are covered with an existing rendering it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated.

7.5 Where the mechanical system is used, the condition of the surface to receive the product is not a consideration provided the fastenings are anchored into a substrate capable of supporting the loads imposed by the external insulation and forces on it. Trial tests are conducted on the walls of the building to determine the pull-out strength of the fastenings. The number of fastenings to be used is calculated using the test data for the fastenings, the relevant wind speed data for the site and, in the absence of a formal requirement, a safety factor of 3.

7.6 Where the adhesive system is used, trial tests are conducted on the walls of the building to determine the adequacy of the adhesive to withstand the expected wind loading derived from calculations using the relevant wind speed data for the site and a safety factor of 9. Where it is necessary, and with walls of no-fines concrete, a recommendation is made on the type and number of fixings required to complement the adhesive mortar to withstand the wind loading. This is based on the calculations used for number of fastenings in the track system (see section 7.5).

7.7 On existing buildings, purpose made sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills

7.8 It is recommended that external plumbing be removed and, where appropriate, alterations made to underground drainage to accommodate its repositioning on the finished face of the system.

7.9 New buildings should be of sound masonry or dense concrete construction.

7.10 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of the system.

8 Procedure

General

8.1 Application is carried out in accordance with STO AG/CCS Scotseal Ltd's Information Manual.

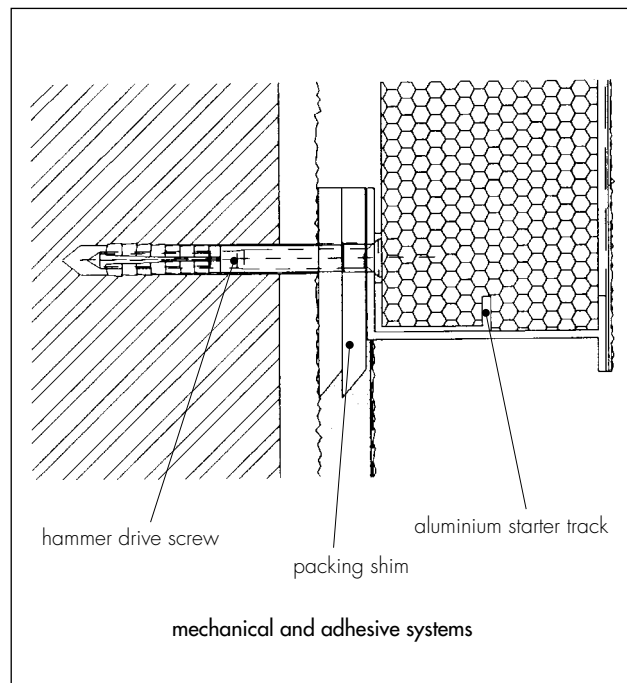
8.2 Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, nor if exposure to frost is likely, and the coating must be protected from rapid drying. Weather conditions should therefore be monitored to ensure correct curing occurs.

Mechanical system

8.3 For installation beginning at the base of the wall the Sto aluminium starter track is used to mount the first row of boards. For installations commencing at first-floor level either the Sto aluminium or PVC-U

starter tracks may be used. Both profiles are fixed to the substrate with Sto hammer-drive screws at 300 mm centres (see Figure 2).

Figure 2 Typical section at base level



8.4 Before fixing the PVC-U starter track a strip of mesh is partially adhered to the wall so that 300 mm of mesh is hanging from the starting line. Sto RFP is subsequently used to wrap the overhanging mesh around the profile and adhere it to the first course of insulation boards. All exposed insulation board edges are protected in this manner (see Figure 3).

8.5 The PVC-U starter track is fixed along the starting line on top of the adhered mesh. The insulation boards are inserted aligning the track flanges with the board grooves and installing vertical T-splines between each board.

8.6 If the aluminium profile is to be used, the boards are positioned in the profile with vertical T-splines in the normal manner. Reinforcing mesh is applied down to the lower lip of the profile (see Figure 2).

8.7 After positioning the first row of boards the horizontal holding tracks are installed into the grooves at the top edges. The holding tracks are fastened to the substrate with hammer-drive screws at 300 mm centres, subsequent rows of boards are installed using the same procedure.

8.8 The boards must be butted tightly together with the vertical joints staggered and any open joints in the system greater than approximately 2 mm must be filled with slivers of insulation board or Sto PU foam. Any high spots or irregularities should be removed by lightly planing with a rasp over the entire surface.

8.9 Packing shims are used at fixing points behind the starter and holding tracks where it is necessary to overcome surface irregularities.

Adhesive system

8.10 Sto Levell-Uni adhesive is prepared by mixing 6 to 7 litres of clean water with every 25 kg bag.

8.11 Installation begins at the base of the wall above the dpc. A firm, horizontal support, either the Sto aluminium profile or a temporary timber batten, is used to mount the first row of boards. The aluminium profile is installed as previously described (see Figure 2).

8.12 If a temporary timber batten is to be used, a strip of mesh is partially adhered to the wall so that 300 mm of mesh is hanging from the starting line of the installation. Sto RFP is subsequently used to wrap the overhanging mesh around the lower edge and adhere it to the first row of insulation boards. All exposed edges of the insulation boards are protected in this manner (see Figure 3).

8.13 The adhesive is applied over the entire face of the insulation board, using a notched trowel, or in a continuous line around the perimeter of the board with six additional dabs of adhesive distributed over the remaining surface.

8.14 The boards must be pressed firmly against the wall and butted tightly together with the vertical joints staggered. Joints in the system greater than approximately 2 mm should be filled with slivers of insulation board or Sto PU foam and any high spots or irregularities removed by lightly planing with a rasp over the whole surface.

8.15 With substrates of no-fines concrete or low loadbearing capacity, Sto Thermo expanding dowels are used as supplementary mechanical fixings at the specified minimum frequency of eight per square metre.

Reinforcing

8.16 Sto RFP is prepared in accordance with STO AG/CCS Scotseal Ltd's Information Manual.

8.17 The prepared base coat is applied to an approximate thickness of 4 mm over the insulation boards, using spray equipment or a stainless steel trowel. The base coat is applied progressively working in 1 m sections in a vertical or horizontal direction.

8.18 The Sto reinforcement mesh is immediately embedded into the wet base coat, and overlapping at all mesh joints by not less than 100 mm. Corner details are reinforced using PVC mesh angle beads or Armor angles.

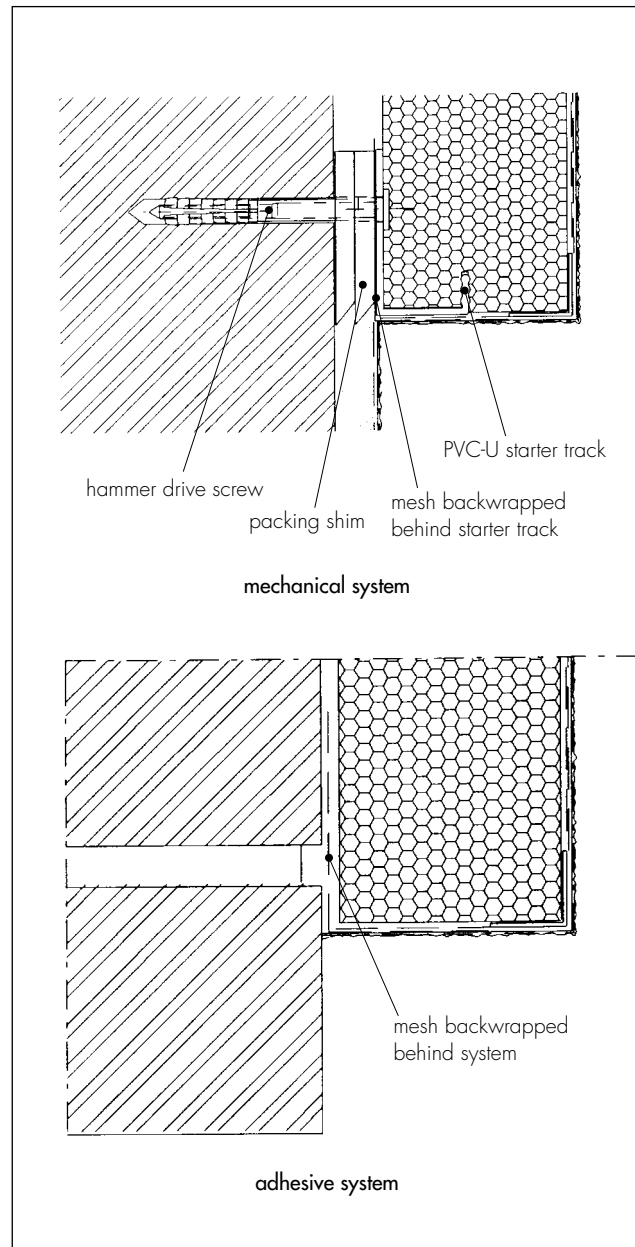
8.19 Additional pieces of reinforcing mesh (450 mm by 250 mm) are used diagonally at the corners of openings.

8.20 The mesh should be free of wrinkles and fully embedded in the base coat with the mesh pattern just visible on the finished surface.

Movement joints

8.21 Generally movement joints are not required in the system but, if an expansion joint is incorporated in the substrate, so a movement joint must be provided in the insulation system.

Figure 3 Typical sections at first floor level



8.22 Where required, the movement joints extend through the full insulation system and are made with the use of Sto profiles E or V (see Figures 4 and 5), or sealed with an approved expansion joint sealant against a backer rod.

8.23 The movement joint sealant must not come into direct contact with the insulation board. Therefore it is essential to ensure that the reinforcement mesh and the base coat are taken round the complete edge of the insulation board.

Finishing

8.24 The base coat should be left to dry thoroughly before application of the decorative finish. Depending on conditions the drying time should be between 24 hours and 48 hours.

8.25 Sto Stolit, Silco and Silco MP are prepared in accordance with the STO AG/CCS Scotseal Ltd's Information Manual and are trowel-applied in thicknesses from 1.5 mm to 6 mm using a stainless steel trowel.

8.26 Sto spar dash finish may be applied to Sto Silco MP. The coating must be at least 6 mm thick, with the 3 mm to 6 mm aggregate applied immediately after application, while the coating is still soft. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure a good bond is achieved.

8.27 The finish coats should be allowed to dry thoroughly before the Sto paints are applied to any features.

8.28 Continuous surfaces must be completed without a break, so the coatings must always be applied to a wet edge.

8.29 At the top of walls the insulation boards must be protected by fitting under a soffit or similar projection and be sealed using Stoseal tape (see Figure 6).

Figure 4 Vertical expansion joint type E

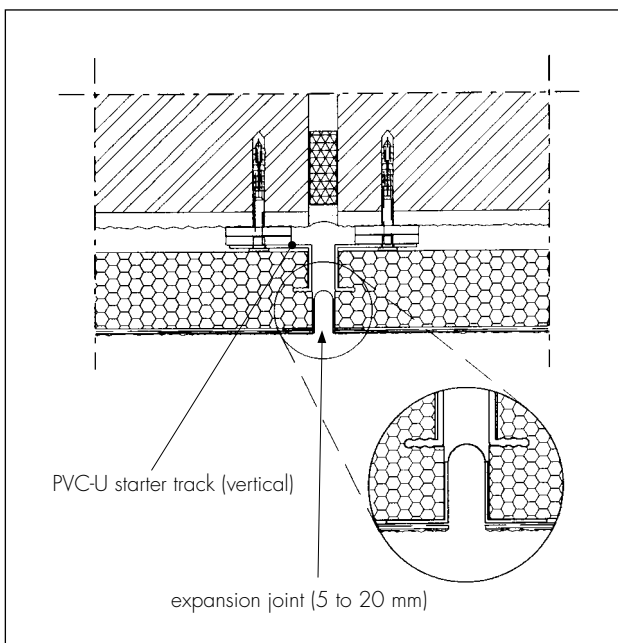


Figure 5 Corner expansion joint type V

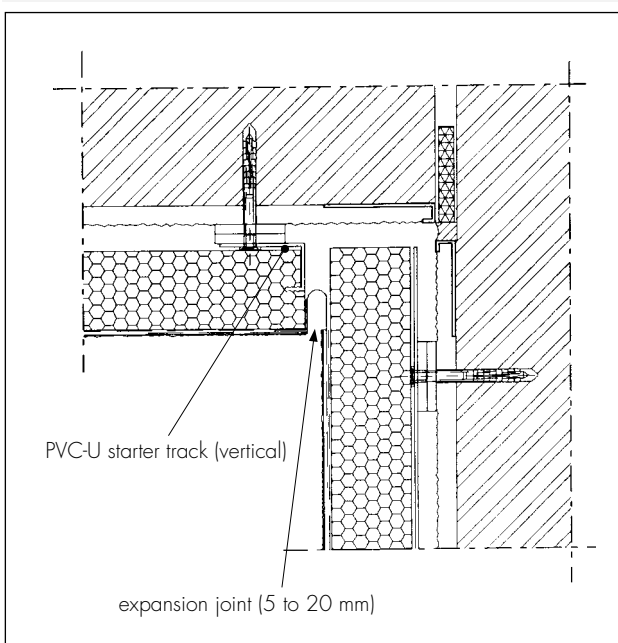
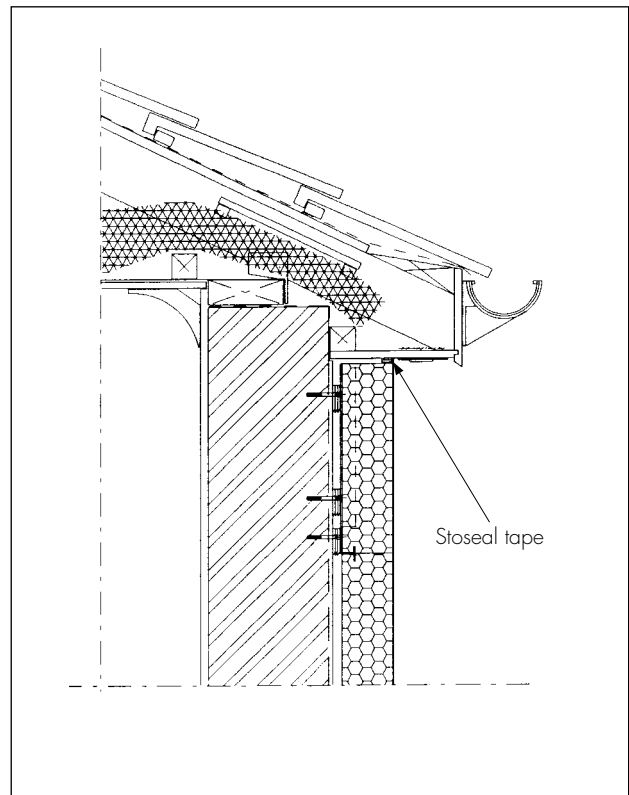


Figure 6 Eaves detail pitched roof



8.30 At windows and doors the insulation should be continued around the reveals where there is sufficient clearance. New buildings should be built to allow this. Where there is insufficient clearance the base coat, reinforcement mesh and render decorative finish should be continued into the reveal. The insulation system must be sealed around window frames and sills to give an elastic joint using Stoseal tape or, in uninsulated reveals, Sto F 500 sealant (see Figures 7 and 8).

8.31 On completion external fittings are re-fixed to the substrate using suitable fixing pads previously installed in the system.

Figure 7 Insulated reveal

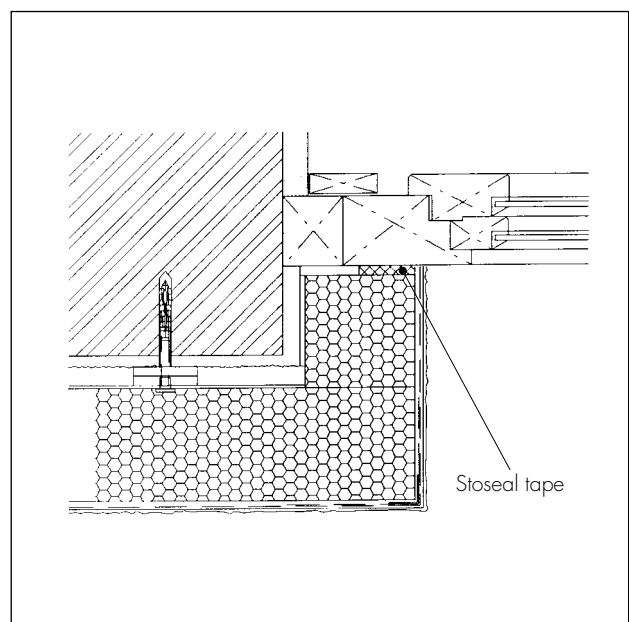
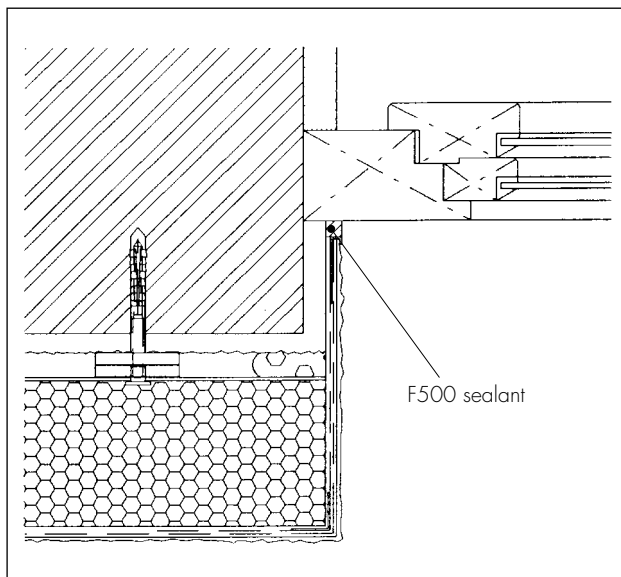


Figure 8 Uninsulated reveal



Technical Investigations

The following is a summary of the technical investigations carried out on the StoTherm Classic External Wall Insulation System.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water vapour permeability.

9.2 An examination was made of data relating to:
fire propagation tests to BS 476 : Part 6 : 1989
surface spread of flame tests to BS 476 : Part 7 : 1987
fire barrier suitability

pull-out strength of the system

thermal conductivity to BS 874 : Part 2 : Section 2.1 : 1986.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 An assessment of the risk of interstitial condensation was undertaken.

10.3 Data generated from the assessment resulting in Certificates Nos 90/2433/C and 90/2460/C were used in support of this approval.

Bibliography

BS 476 *Fire tests on building materials and structures*
Part 4 : 1970(1984) *Non-combustibility test for materials*

Part 6 : 1989 *Method of test for fire propagation for products*

Part 7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulating properties*

Part 2 *Tests for thermal conductivity and related properties*

Section 2.1 : 1986 *Guarded hot-plate method*

CP 3 *Code of basic data for the design of buildings*
Chapter V *Loading*

Part 2 : 1972 *Wind loads*

MOAT No 22 : 1988 *UEAtc Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*



On behalf of the British Board of Agrément

Date of issue: 19th October 1995

Director

1 Summary

Insulation

SDA FRA grade expanded polystyrene boards. Nominal density between 14 and 17 kgm⁻³ minimum compressive strength 70 kPa and minimum cross-breaking strength 140 kPa. UHD grade EPS boards may be used at ground-floor level.

Adhesive

Sto Levell-Uni — a polymer-based powder containing cement — mixed with water.

Reinforcement

Mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating — nominal weight of 150 gm⁻².

Base coat

Sto RFP — a ready mixed, cement-free, polymer-based paste.

Finishes

Sto Stolit, Silco and Silco MP — ready mixed, acrylic/silicone-based, textured coatings.

2 Thermal properties

Thermal conductivity of insulation boards

0.037 Wm⁻¹K⁻¹.

U values

Using values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm⁻³) with 10 mm plasterboard:

Insulation thickness (mm)	U-value (Wm ⁻² K ⁻¹)
20	0.86
40	0.59
50	0.51
60	0.45
70	0.40
100	0.30
120	0.26
150	0.21

3 Impact resistance

The system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings, walls of communal dwellings above ground floor. In other situations, eg walls of public buildings, at ground-floor level, combined heavy duty mesh and base coat plus standard mesh and second base coat is required to increase the resistance to impact.

4 Properties in relation to fire

The system is classified Class 0 as defined in the appropriate Building Regulations.

5 Design wind loading and resistance to wind suction

Using CP 3 : Chapter V : Part 2 : 1972, the system can be designed to withstand all expected suction wind loadings.

6 Durability

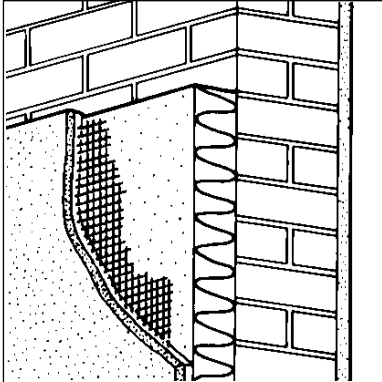
Age of oldest installation seen by BBA

12 years.

Assessed life

30 years.

Product



• THIS DETAIL SHEET RELATES TO THE STOTHERM MINERAL EXTERNAL WALL INSULATION SYSTEM, A SYSTEM EMPLOYING MINERAL FIBRE INSULATION SLABS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.

- The system is applied to the outside of external walls of masonry, dense, or no-fines concrete construction and is suitable for new or existing buildings.
- It is essential that the Sto system is installed and maintained in accordance with the conditions set out in the Design Data and Installation parts of this Certificate.
- See the Appendix for system summary.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The StoTherm Mineral External Wall Insulation System (see Figure 1) comprises:

(1) Sto Mechanical System — a PVC-U or aluminium track system comprising horizontal starter and holding tracks 2.5 m long, and vertical T-splines 0.495 m long. Starter and holding tracks are fastened to substrates with Sto approved hammer-drive screws.

(2) Sto Adhesive System — Levell-Uni — a polymer based powder containing cement which, when mixed with clean water, can be used as an adhesive.

(3) Sto Mineral Fibre Insulation Slabs with a nominal density of 140 kgm^{-3} supplied in the following sizes:

Mechanical system

size (mm) 600×500
thickness (mm) 60 to 120

Adhesive system

size (mm) 900×600
thickness (mm) 20 to 140

(4) Sto Reinforcement Mesh — a 1 m wide mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating and weighing approximately 150 gm^{-2} .

(5) Sto Armor Mat — used with and having the same specification as Sto Reinforcement Mesh but weighing approximately 490 gm^{-2} .

(6) Sto primer coat — an acrylate copolymer based primer used as a bonding agent and pre-coat to control suction.

(7) Sto Stolit — a ready mixed, acrylic based, textured coating.

(8) Sto Silco — a ready mixed, silicone based, textured coating.

(9) Sto Silco MP — a ready mixed, silicone based, textured coating or receiver for dry dash finish.

(10) Sto Dash Finish — a spar-dash aggregate (3 mm to 6 mm) for use with Sto Silco MP.

(11) Sto Maxicryl, Crylan, Silco Color and Jumbo Sil — acrylic/silicone based paint available in a range of colours.

(12) Ancillary materials:

Stoplex W sealer

StoPrim Micro sealer

aluminium starter track

PVC-U starter track

PVC mesh angle bead

Sto detail mesh

Armor angle

expansion joint profile type E

expansion joint profile type V

Stoseal tape

PU foam filler

Sto Decoprofiles (recycled glass profiles for window details)

Sto Color Royal (acrylic-based paint for use with Sto Decoprofiles)

Sto Flexyl Adhesive for Decoprofiles

SS hammer drive fixings

Spit ISO fixings

Sto dowels

self-drill/Buildex SS-type screw

PVC packing shims

Sto Primer

Sto Fungal

Sto F500 sealant.

1.2 Sto mineral wool insulation slabs are fixed to the external surface of the wall using the Sto Track System or the Sto Levell-Uni adhesive. The insulation slabs are protected by a 4 mm coat of Sto Levell-Uni coat containing a glass-fibre reinforcement mesh. After allowing sufficient time to dry, the base coat is primed. When the Sto Primer is dry, Sto Stolit, Silco or Silco MP is applied in thicknesses from 1.5 mm to 6 mm. Sto paints are applied as required, for features. Where a Sto Dash Finish is required, it can only be applied to Sto Silco MP applied in a thickness of between 5 mm and 6 mm.

1.3 On substrates of no-fines concrete, the insulation slabs are fixed using either the Sto Mechanical System or the Sto adhesive system with supplementary mechanical fixings applied where required.

1.4 All components are subject to routine factory quality control.

2 Delivery and site handling

2.1 Sto insulation slabs are delivered to site shrink-wrapped in polythene. Each pack bears the manufacturer's name and product identification.

2.2 The insulation slabs should be stored on a firm, clean, level base, off the ground and under cover until required for use. Care must be taken when handling the insulation to avoid damage.

2.3 Sto, Silco, Stolit and Silco MP are supplied in 25 kg plastic pails bearing the product identification and batch numbers. They should be protected from excessive heat and frost.

2.4 Sto Levell-Uni is supplied in 25 kg triple-lined bags and should be stored in dry conditions, off the ground, and protected from moisture.

2.5 The reinforcing meshes are supplied in 1 m wide rolls in lengths of:

Sto Reinforcement Mesh	50 m
Sto Armor Mat	25 m

Design Data


3 Strength and stability

3.1 The StoTherm Mineral External Wall Insulation System has adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage (see section 8.3 of the Front Sheets).

3.2 The system as specified in this Detail Sheet can be designed to withstand the thermal stresses and wind pressures (including suction) normally experienced in the United Kingdom. The system can also be designed in accordance with CP 3 : Chapter V : Part 2 : 1972 to withstand the increased wind loads associated with tall buildings (greater than 12 metres) and areas of high exposure. This may require the use

of additional track fastenings or, where the system is adhesively fixed, the addition of mechanical fixings.

4 Properties in relation to fire

 4.1 In the opinion of the BBA, the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as defined in paragraph A12 of Approved Document B to the Building Regulations 1991 (as amended 1994) (England and Wales), the Appendix to Part D of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended) and Section 2.4 of Technical Booklet E to the Building Regulations (Northern Ireland) 1994 (as amended 1995).


4.3 The behaviour in fire of external wall insulation systems is the subject of recommendations by the Building Research Establishment which, for the system, makes no restriction on the height of the building to be treated.

5 Proximity of flues

With this system there are no provisions to be met.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as $0.036 \text{ Wm}^{-1}\text{K}^{-1}$.


 6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in:

Approved Document L1 (1995 Edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), or

Part J of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended), or

Technical Booklet F to the Building Regulations (Northern Ireland) 1994 (as amended 1995).

6.3 In these documents guidance is also given on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are described which allow for some flexibility in design of U values for individual constructional elements.

 6.4 For constructions subject to the Building Regulations 1991 (as amended 1994) (England and Wales) the effect of thermal bridging should be taken into account in any U value calculations.

6.5 Where insulation slabs have not been continued into window or door reveals due to a lack of clearance, there will be a risk of cold bridging

at these points. Where door and window frames are to be replaced, it is recommended that their size be adjusted to permit the reveals to be insulated.

6.6 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulations should continue over the wall head. Care should be taken to ensure that ventilation openings are not obstructed.

Installation

7 Site survey and preliminary work

7.1 A pre-installation survey of the property is carried out to determine suitability for treatment and necessary repairs to the building structure. The survey should include tests and an assessment and recommendation on the type and number of fastenings required in respect of the building's expected wind loading. A specification is prepared for each elevation of the building indicating:

- position of tracks (for track system)
- position of starter profile or starter mesh (for adhesively fixed system)
- reinforcing mesh(es)
- detailing around windows, doors and at eaves
- dpc level
- exact position of expansion joints, if required
- areas where flexible sealants must be used
- alterations required to external plumbing.

7.2 All necessary repairs to the building structure are completed before installation of the system is started.

7.3 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked and any excessive irregularities made good prior to installation to ensure that the insulation slabs are installed with a smooth, in-plane finished surface.

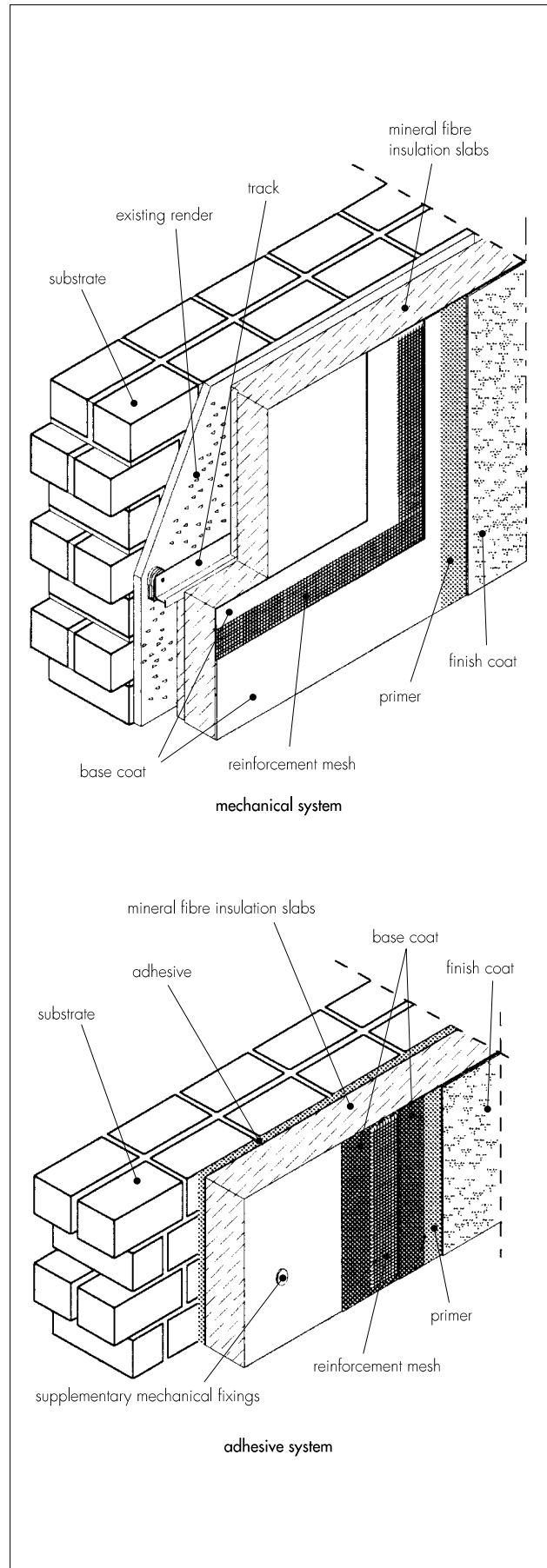
7.4 Where surfaces are covered with an existing rendering it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated.

7.5 Where the mechanical system is used, the condition of the surface to receive the product is not a consideration provided the fastenings are anchored into a substrate capable of supporting the loads imposed by the external insulation and forces on it. Trial tests are conducted on the walls of the building to determine the pull-out strength of the fastenings. The number of fastenings to be used is calculated using the test data for the fastenings, the relevant wind speed data for the site and, in the absence of a formal requirement, a safety factor of 3.

7.6 Where the adhesive system is used, trial tests are conducted on the walls of the building to determine the adequacy of the adhesive to withstand the expected wind loading derived from calculations using the relevant wind speed data for the site and a safety factor of 9. Where it is necessary, and with walls of no-fines concrete, a recommendation is made on the

type and number of fixings required to complement the adhesive mortar to withstand the wind loading. This is based on the calculations used for number of fastenings in the track system (see section 7.5).

Figure 1 StoTherm Mineral External Wall Insulation System



7.7 On existing buildings, purpose made sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills

7.8 It is recommended that external plumbing be removed and, where appropriate, alterations made to underground drainage to accommodate its repositioning on the finished face of the system.

7.9 New buildings should be of sound masonry or dense concrete construction.

7.10 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of the system.

8 Procedure

General

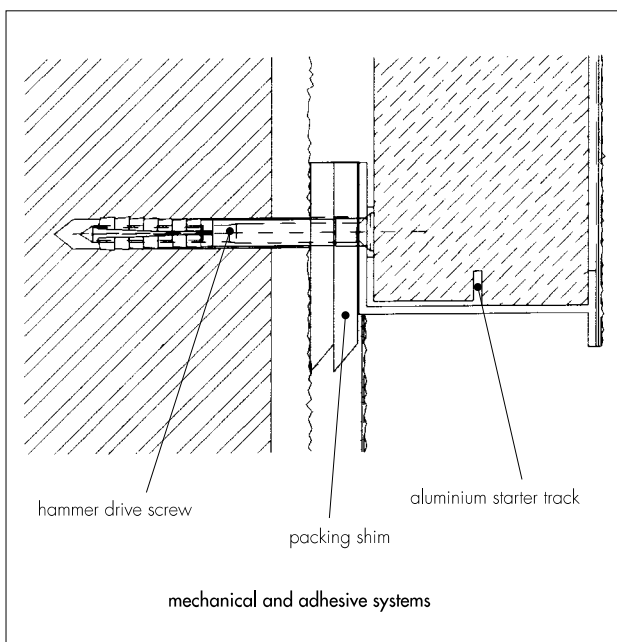
8.1 Application is carried out in accordance with STO AG/CCS Scotseal Ltd's Information Manual.

8.2 Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, nor if exposure to frost is likely, and the coating must be protected from rapid drying. Weather conditions should therefore be monitored to ensure correct curing occurs.

Mechanical system

8.3 For installation beginning at the base of the wall the Sto aluminium starter track is used to mount the first row of slabs. For installations commencing at first-floor level either the Sto aluminium or PVC-U starter tracks may be used. Both profiles are fixed to the substrate with Sto hammer-drive screws at 300 mm centres (see Figure 2).

Figure 2 Typical section at base level

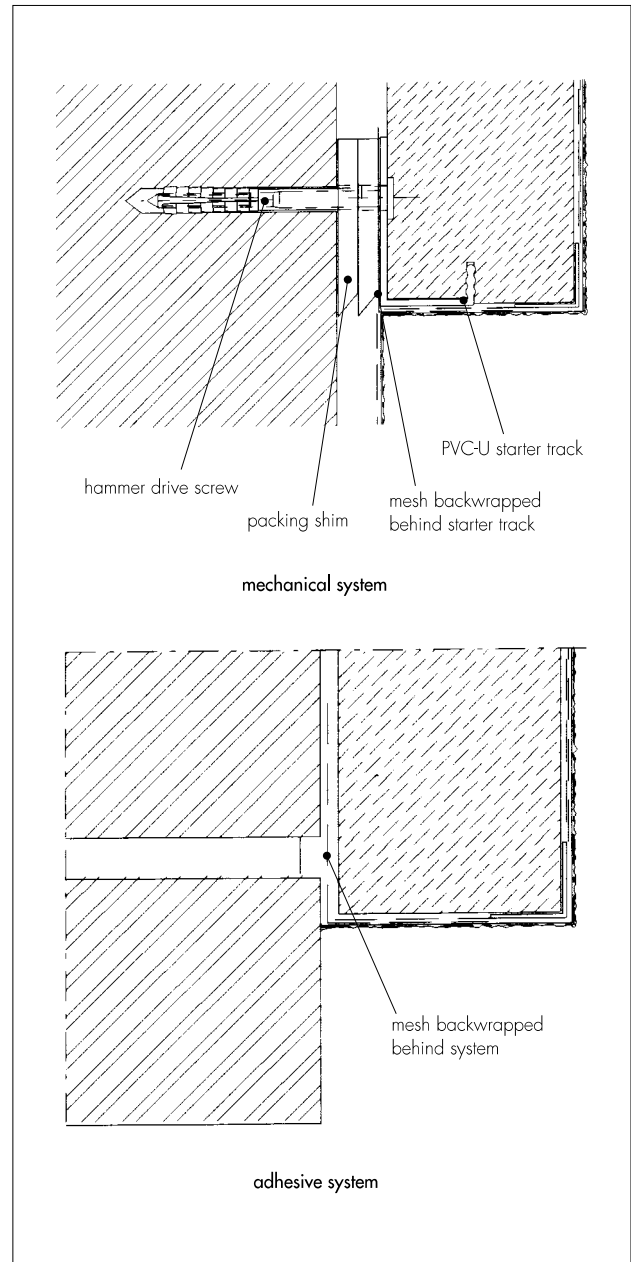


8.4 Before fixing the PVC-U starter track a strip of mesh is partially adhered to the wall so that 300 mm of mesh is hanging from the starting line. Sto Level-Uni is subsequently used to wrap the overhanging mesh around the profile and adhere it to the first

course of insulation slabs. All exposed insulation slab edges are protected in this manner (see Figure 3).

8.5 The PVC-U starter track is fixed along the starting line on top of the adhered mesh. The insulation slabs are inserted aligning the track flanges with the slab grooves and installing vertical T-splines between each slab.

Figure 3 Typical sections at first-floor level



8.6 If the aluminium profile is to be used, the slabs are positioned in the profile with vertical T-splines in the normal manner. Reinforcing mesh is applied down to the lower lip of the profile (see Figure 2).

8.7 After positioning the first row of slabs the horizontal holding tracks are installed into the grooves at the top edges. The holding tracks are fastened to the substrate with hammer-drive screws at 300 mm centres, subsequent rows of boards are installed using the same procedure.

8.8 The slabs must be butted tightly together with the vertical joints staggered.

8.9 Packing shims are used at fixing points behind the starter and holding tracks where it is necessary to overcome surface irregularities.

Adhesive system

8.10 Sto Levell-Uni adhesive is prepared by mixing 6 to 7 litres of clean water with every 25 kg bag.

8.11 Installation begins at the base of the wall above the dpc. A firm, horizontal support, either the Sto aluminium profile or a temporary timber batten, is used to mount the first row of slabs. The aluminium profile is installed as previously described (see Figure 2).

8.12 If a temporary timber batten is to be used, a strip of mesh is partially adhered to the wall so that 300 mm of mesh is hanging from the starting line of the installation. Sto Levell-Uni is subsequently used to wrap the overhanging mesh around the lower edge and adhere it to the first row of insulation slabs. All exposed edges of the insulation slabs are protected in this manner (see Figure 3).

8.13 The adhesive is applied over the entire face of the insulation board, using a notched trowel, or in a continuous line around the perimeter of the slab with six additional dabs of adhesive distributed over the remaining surface.

8.14 The slabs must be pressed firmly against the wall and butted tightly together with the vertical joints staggered. Alignment should be checked as work proceeds.

8.15 Where necessary, Sto expanding dowels are used as supplementary mechanical fixings at the specified minimum frequency of eight per square metre.

Reinforcing

8.16 Sto Levell-Uni is prepared as previously described.

8.17 The prepared base coat is applied to an approximate thickness of 4 mm over the insulation slabs, using a stainless steel trowel. The base coat is applied progressively working in 1 m sections in a vertical or horizontal direction.

8.18 The Sto reinforcement mesh is immediately embedded into the wet base coat, and overlapping at all mesh joints by not less than 100 mm. Corner details are reinforced using PVC mesh angle beads or Armor angles.

8.19 Additional pieces of reinforcing mesh (450 mm by 250 mm) are used diagonally at the corners of openings.

8.20 The mesh should be free of wrinkles and fully embedded in the base coat with the mesh pattern just visible on the finished surface.

Movement joints

8.21 Generally, movement joints are not required in the system but, if an expansion joint is incorporated in the substrate, so a movement joint must be provided in the insulation system.

8.22 Where required, the movement joints extend through the full insulation system and are made with the use of Sto profiles E or V (see Figures 4 and 5), or sealed with an approved expansion joint sealant against a backer rod.

Figure 4 Vertical expansion joint type E

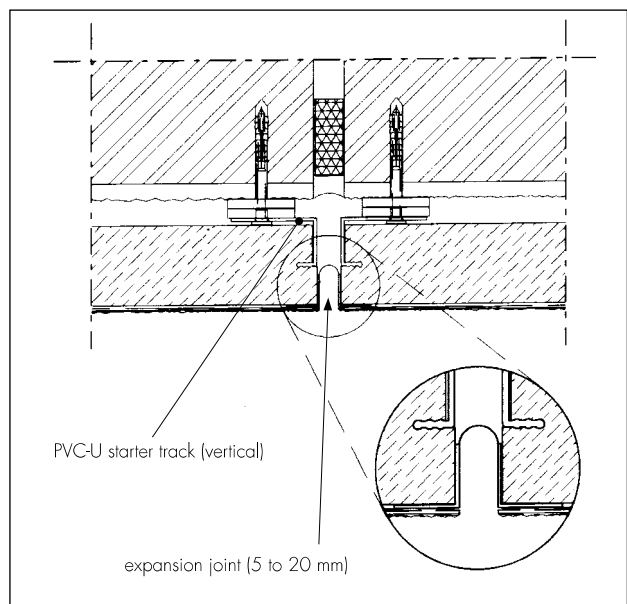
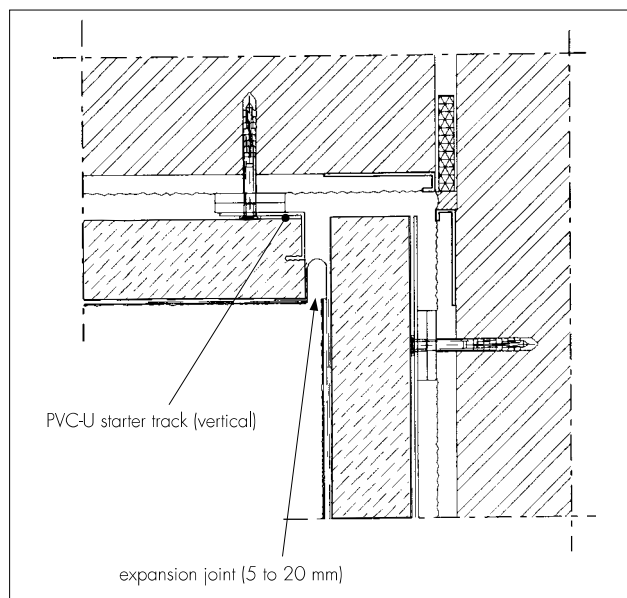


Figure 5 Corner expansion joint type V



8.23 The movement joint sealant must not come into direct contact with the insulation slab. Therefore it is essential to ensure that the reinforcement mesh and the base coat are taken round the complete edge of the insulation slab.

Finishing

8.24 The base coat should be left to dry thoroughly before application of the decorative finish. Depending on conditions the drying time should be between 24 hours and 48 hours. Sto primer coat is applied by brush or roller and allowed to dry prior to application of the decorative finish.

8.25 Sto Stolit, Silco and Silco MP are prepared in accordance with the STO AG/CCS Scotseal Ltd's Information Manual and are trowel-applied in thicknesses from 1.5 mm to 6 mm using a stainless steel trowel.

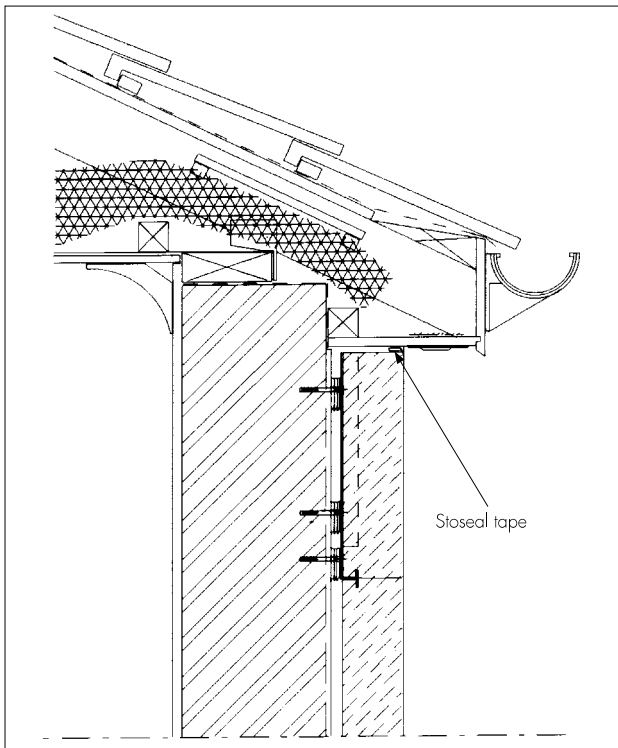
8.26 Sto spar dash finish may be applied to Sto Silco MP. The coating must be at least 6 mm thick, with the 3 mm to 6 mm aggregate applied immediately after application, while the coating is still soft. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure a good bond is achieved.

8.27 The finish coats should be allowed to dry thoroughly before the Sto paints are applied to any features.

8.28 Continuous surfaces must be completed without a break, so the coatings must always be applied to a wet edge.

8.29 At the top of walls the insulation slabs must be protected by fitting under a soffit or similar projection and be sealed using Stoseal tape (see Figure 6).

Figure 6 Eaves detail pitched roof



8.30 At windows and doors the insulation should be continued around the reveals where there is sufficient clearance. New buildings should be built to allow this. Where there is insufficient clearance the base coat, reinforcement mesh and render decorative finish should be continued into the reveal. The insulation system must be sealed around window frames and sills to give an elastic joint using Stoseal tape or, in uninsulated reveals, Sto F 500 sealant (see Figures 7 and 8).

8.31 On completion external fittings are re-fixed to the substrate using suitable fixing pads previously installed in the system.

Figure 7 Insulated reveal

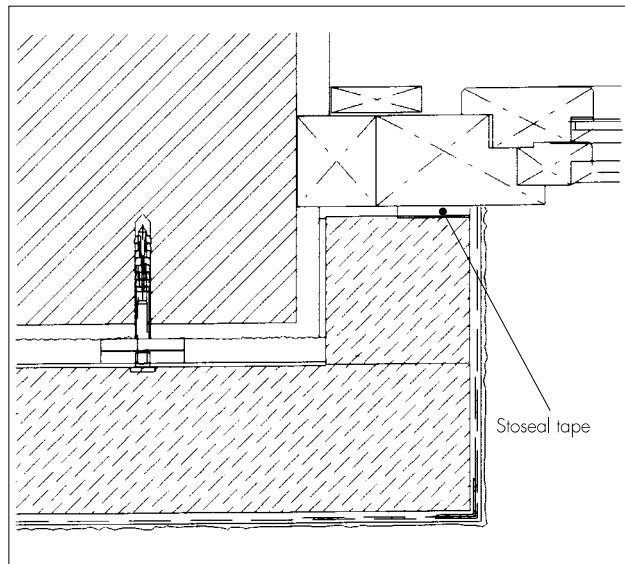
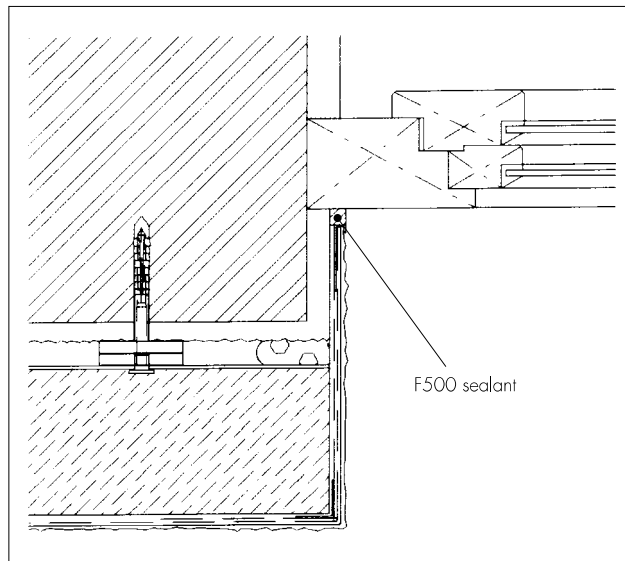


Figure 8 Uninsulated reveal



Technical Investigations

The following is a summary of the technical investigations carried out on the StoTherm Mineral External Wall Insulation System.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

- component characterisation
- heat/spray cycling
- resistance to freeze/thaw
- impact resistance
- water vapour permeability.

9.2 An examination was made of data relating to:

- fire propagation tests to BS 476 : Part 6 : 1989
- surface spread of flame tests to BS 476 : Part 7 : 1987
- pull-out strength of the system
- thermal conductivity to BS 874 : Part 2 : Section 2.1 : 1986.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 An assessment of the risk of interstitial condensation was undertaken.

10.3 Data generated from the assessment resulting in Certificates Nos 90/2433/C and 90/2460/C were used in support of this approval.

Bibliography

BS 476 *Fire tests on building materials and structures*
Part 4 : 1970(1984) *Non-combustibility test for materials*

Part 6 : 1989 *Method of test for fire propagation for products*

Part 7 : 1987 *Method for classification of the surface spread of flame of products*

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Part 2 *Tests for thermal conductivity and related properties*

Section 2.1 : 1986 *Guarded hot-plate method*

CP 3 *Code of basic data for the design of buildings*

Chapter V *Loading*

Part 2 : 1972 *Wind loads*

MOAT No 22 : 1988 *UEAtc Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*



On behalf of the British Board of Agrément

Date of issue: 9th October 1996

Director

1 Summary

Insulation

Sto mineral fibre insulation slabs 900 mm by 600 mm and 600 mm by 500 mm in a range of thicknesses from 20 mm to 140 mm, with a nominal density of 140 kgm^{-3} .

Adhesive

Sto Levell-Uni — a polymer-based powder containing cement — mixed with water.

Reinforcement

Mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating — nominal weight of 150 gm^{-2} .

Base coat

Sto Levell-Uni — a polymer-based powder containing cement — mixed with water.

Sto primer coat — an acrylate copolymer based primer used as a bonding agent and pre-coat to control suction.

Finishes

Sto Stolit, Silco and Silco MP — ready mixed, acrylic/silicone-based, textured coatings.

2 Thermal properties

Thermal conductivity of insulation boards

$0.036 \text{ Wm}^{-1}\text{K}^{-1}$.

U values

Using values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation
thickness
(mm)

U-value
($\text{Wm}^{-2}\text{K}^{-1}$)

20	0.85
50	0.50
60	0.44
70	0.39
100	0.30
120	0.25
140	0.22

3 Impact resistance

The system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings, walls of communal dwellings above ground floor. In other situations, eg walls of public buildings, at ground-floor level, combined heavy duty mesh and base coat plus standard mesh and second base coat is required to increase the resistance to impact.

4 Properties in relation to fire

The system is classified Class 0 as defined in the appropriate Building Regulations.

5 Design wind loading and resistance to wind suction

Using CP 3 : Chapter V : Part 2 : 1972, the system can be designed to withstand all expected suction wind loadings.

6 Durability

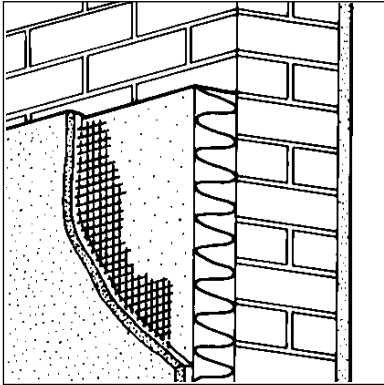
Age of oldest installation seen by BBA

14 years

Assessed life

30 years.

Product



• THIS DETAIL SHEET RELATES TO THE STOTHERM LAMELLA EXTERNAL WALL INSULATION SYSTEM, A SYSTEM EMPLOYING LAMELLA INSULATION SLABS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.

• The system is applied to the outside of external walls of masonry, dense, or no-fines concrete construction and is suitable for new or existing buildings.

• It is essential that the Sto system is installed and maintained in accordance with the conditions set out in the Design Data and Installation parts of this Certificate.

• See the Appendix for system summary.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

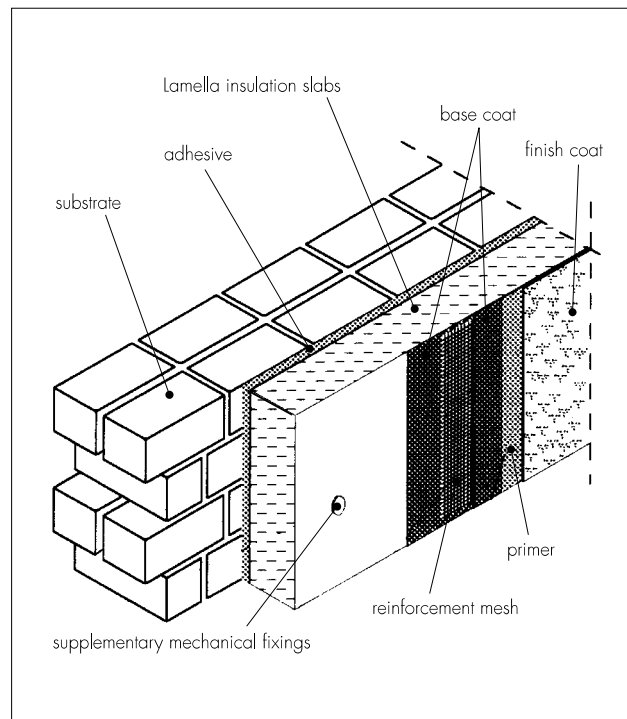
Technical Specification

1 Description

1.1 The StoTherm Lamella External Wall Insulation System (see Figure 1) comprises:

- (1) Sto Levell-Uni — a polymer based powder containing cement which, when mixed with clean water, can be used as an adhesive or the basecoat.
- (2) Sto Lamella Insulation Slabs — 1000 mm by 200 mm in a range of thicknesses from 40 mm to 200 mm, with a nominal density of 95 kgm^{-3} .
- (3) Sto Reinforcement Mesh — a 1 m wide mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating and weighing approximately 150 gm^{-2} .
- (4) Sto Armor Mat — used with and having the same specification as Sto Reinforcement Mesh but weighing approximately 490 gm^{-2} .
- (5) Sto primer coat — an acrylate copolymer based primer used as a bonding agent and pre-coat to control suction.
- (6) Sto Stolit — a ready mixed, acrylic based, textured coating.
- (7) Sto Silco — a ready mixed, silicone based, textured coating.
- (8) Sto Silco MP — a ready mixed, silicone based, textured coating or receiver for dry-dash finish.

Figure 1 StoTherm Lamella External Wall Insulation System



(9) Sto Dash Finish — a spar-dash aggregate (3 mm to 6 mm) for use with Sto Silco MP.

(10) Sto Maxicryl, Crylan, Silco Color and Jumbo Sil — acrylic/silicone based paint available in a range of colours.

(11) Ancillary materials:

Stoplex W sealer
StoPrim Micro sealer

aluminium starter track
PVC mesh angle bead
Sto detail mesh
Armor angle
expansion joint profile type E
expansion joint profile type V
Stoseal tape
PU foam filler
Sto Decoprofiles (recycled glass profiles for window details)
Sto Color Royal (acrylic-based paint for use with Sto Decoprofiles)
Sto Flexyl Adhesive for Decoprofiles
SS hammer drive fixings
Spit ISO fixings
Sto dowels
PVC packing shims
Sto Primer
Sto Fungal
Sto F500 sealant.

1.2 Sto Lamella insulation slabs are fixed to the external surface of the wall using the Sto Levell-Uni adhesive. The insulation slabs are protected by a 4 mm coat of Sto Levell-Uni containing a glass-fibre reinforcement mesh. After allowing sufficient time to dry, the base coat is primed. When the Sto primer is dry Sto Stolit, Silco or Silco MP is applied in thicknesses from 1.5 mm to 6 mm. Sto paints are applied as required, for features. Where a Sto Dash Finish is required, it can only be applied to Sto Silco MP applied in a thickness of between 5 mm and 6 mm.

1.3 On no-fines or when installations are above 20 metres, supplementary mechanical fixings are applied through the reinforcing mesh at the minimum specified frequency of eight per square metre.

1.4 All components are subject to routine factory quality control.

2 Delivery and site handling

2.1 Sto insulation slabs are delivered to site shrink-wrapped in polythene. Each pack bears the manufacturer's name and product identification.

2.2 The insulation slabs should be stored on a firm, clean, level base, off the ground and under cover until required for use. Care must be taken when handling the insulation to avoid damage.

2.3 Sto Silco, Stolit and Silco MP are supplied in 25 kg plastic pails bearing the product identification and batch numbers. They should be protected from excessive heat and frost.

2.4 Sto Levell-Uni is supplied in 25 kg triple-lined bags and should be stored in dry conditions, off the ground, and protected from moisture.

2.5 The reinforcing meshes are supplied in 1 m wide rolls in lengths of:

Sto Reinforcement Mesh	50 m
Sto Armor Mat	25 m

3 Strength and stability

3.1 The StoTherm Lamella External Wall Insulation System has adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage (see section 8.3 of the Front Sheets).

3.2 The system as specified in this Detail Sheet can be designed to withstand the thermal stresses and wind pressures (including suction) normally experienced in the United Kingdom. The system can also be designed in accordance with CP 3 : Chapter V : Part 2 : 1972 to withstand the increased wind loads associated with tall buildings (greater than 12 metres) and areas of high exposure. This may require the use of additional mechanical fixings.

4 Properties in relation to fire



4.1 In the opinion of the BBA, the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as defined in paragraph A12 of Approved Document B to the Building Regulations 1991 (as amended 1994) (England and Wales), the Appendix to Part D of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended) and Section 2.4 of Technical Booklet E to the Building Regulations (Northern Ireland) 1994 (as amended 1995).

4.3 The behaviour in fire of external wall insulation systems is the subject of recommendations by the Building Research Establishment which, for the system, makes no restriction on the height of the building to be treated.

5 Proximity of flues

With this system there are no provisions to be met.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as $0.040 \text{ Wm}^{-1}\text{K}^{-1}$.



6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in:

Approved Document L1 (1995 Edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), or Part J of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended), or Technical Booklet F to the Building Regulations (Northern Ireland) 1994 (as amended 1995).

6.3 In these documents guidance is also given on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are described which allow for some flexibility in design of U values for individual constructional elements.



6.4 For constructions subject to the Building Regulations 1991 (as amended 1994) (England and Wales) the effect of thermal bridging should be taken into account in any U value calculations.

6.5 Where insulation slabs have not been continued into window or door reveals due to a lack of clearance, there will be a risk of cold bridging at these points. Where door and window frames are to be replaced, it is recommended that their size be adjusted to permit the reveals to be insulated.

6.6 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulations should continue over the wall head. Care should be taken to ensure that ventilation openings are not obstructed.

Installation

7 Site survey and preliminary work

7.1 A pre-installation survey of the property is carried out to determine suitability for treatment and necessary repairs to the building structure. The survey should include tests and an assessment and recommendation on the adequacy of adhesive fixing and the number of mechanical fixings if required, in respect of the building's expected wind loading. A specification is prepared for each elevation of the building indicating:

- position of starter profile or starter mesh
- reinforcing mesh(es)
- detailing around windows, doors and at eaves
- dpc level
- exact position of expansion joints, if required
- areas where flexible sealants must be used
- alterations required to external plumbing.

7.2 All necessary repairs to the building structure are completed before installation of the system is started.

7.3 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked and any excessive irregularities made good prior to installation to ensure that the insulation slabs are installed with a smooth, in-plane finished surface.

7.4 Where surfaces are covered with an existing rendering it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated.

7.5 Where the adhesive system is used, trial tests are conducted on the walls of the building to determine the adequacy of the adhesive to withstand the expected wind loading derived from calculations using the relevant wind speed data for the site and a safety factor of 9. Where it is necessary, and with walls of no-fines concrete, a recommendation is made on the type and number of fixings required to complement the adhesive mortar to withstand the wind loading.

7.6 On existing buildings, purpose made sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills

7.7 It is recommended that external plumbing be removed and, where appropriate, alterations made to underground drainage to accommodate its repositioning on the finished face of the system.

7.8 New buildings should be of sound masonry or dense concrete construction.

7.9 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of the system.

8 Procedure

General

8.1 Application is carried out in accordance with STO AG/CCS Scotseal Ltd's Information Manual.

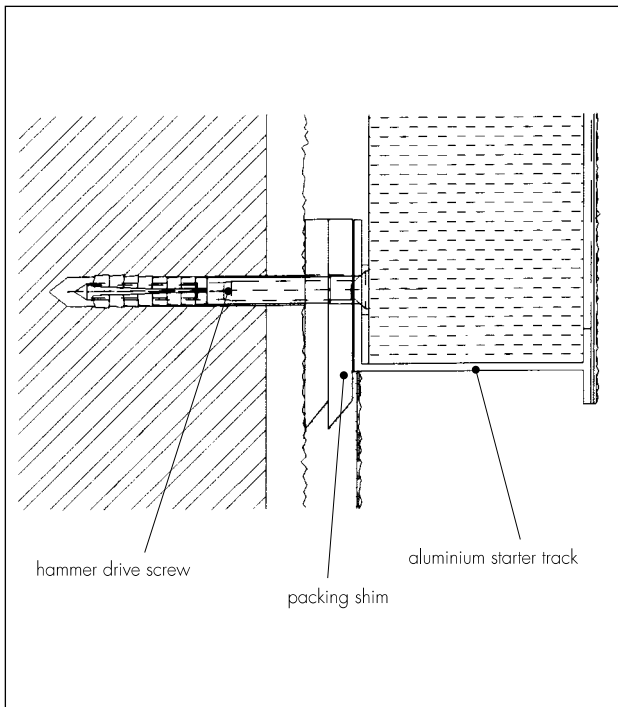
8.2 Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, nor if exposure to frost is likely, and the coating must be protected from rapid drying. Weather conditions should therefore be monitored to ensure correct curing occurs.

Positioning and securing insulation slabs

8.3 Sto Levell-Uni adhesive is prepared by mixing 6 to 7 litres of clean water with every 25 kg bag.

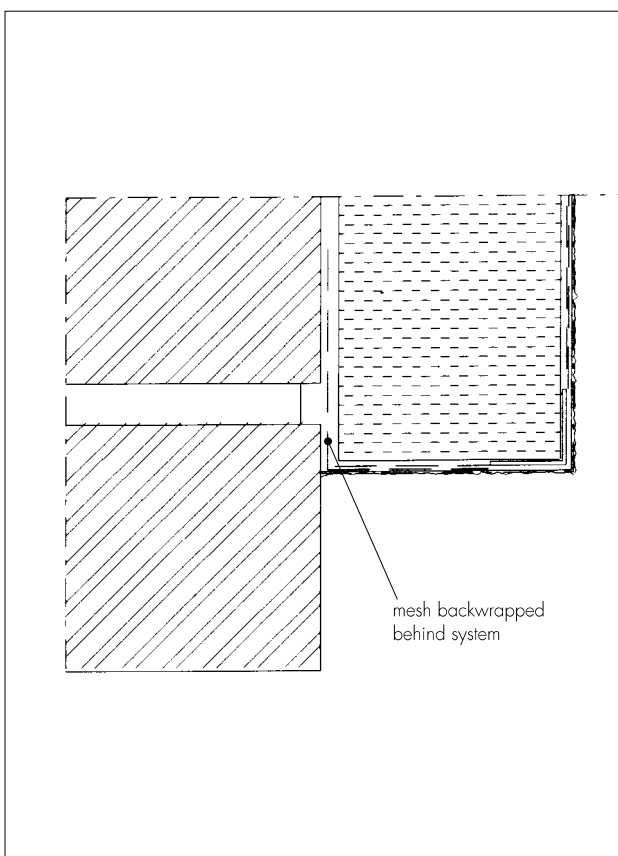
8.4 Installation begins at the base of the wall above the dpc. A firm, horizontal support, either the Sto aluminium profile or a temporary timber batten, is used to mount the first row of slabs. The aluminium profile is fixed to the substrate with Sto hammer-drive screws at 300 mm centres (see Figure 2).

Figure 2 Typical section at base level



8.5 If a temporary timber batten is to be used, a strip of mesh is partially adhered to the wall so that 300 mm of mesh is hanging from the starting line of the installation. Sto Levell-Uni is subsequently used to wrap the overhanging mesh around the lower edge and adhere it to the first row of insulation slabs. All exposed edges of the insulation slabs are protected in this manner (see Figure 3).

Figure 3 Typical sections at first-floor level



8.6 The adhesive is applied over the entire face of the insulation slab, using a notched trowel, or in a continuous line around the perimeter of the slab with six additional dabs of adhesive distributed over the remaining surface.

8.7 The slabs must be pressed firmly against the wall and butted tightly together with the vertical joints staggered. Alignment should be checked as work proceeds.

Reinforcing

8.8 Sto Levell-Uni is prepared as previously described.

8.9 The prepared base coat is applied to an approximate thickness of 4 mm over the insulation slabs, using spray equipment or a stainless steel trowel. The base coat is applied progressively working in 1 m sections in a vertical or horizontal direction.

8.10 The Sto reinforcement mesh is immediately embedded into the wet base coat, and overlapping at all mesh joints by not less than 100 mm. Corner details are reinforced using PVC mesh angle beads or Armor angles.

8.11 Additional pieces of reinforcing mesh (450 mm by 250 mm) are used diagonally at the corners of openings.

8.12 The mesh should be free of wrinkles and fully embedded in the base coat with the mesh pattern just visible on the finished surface.

8.13 Where necessary Sto expanding dowels are used as supplementary mechanical fixings at the specified minimum frequency of eight per square metre. The fixings are applied through the reinforcing mesh before the basecoat hardens. The fixings are then covered with more basecoat and square pieces of mesh measuring no less than 150 mm by 150 mm.

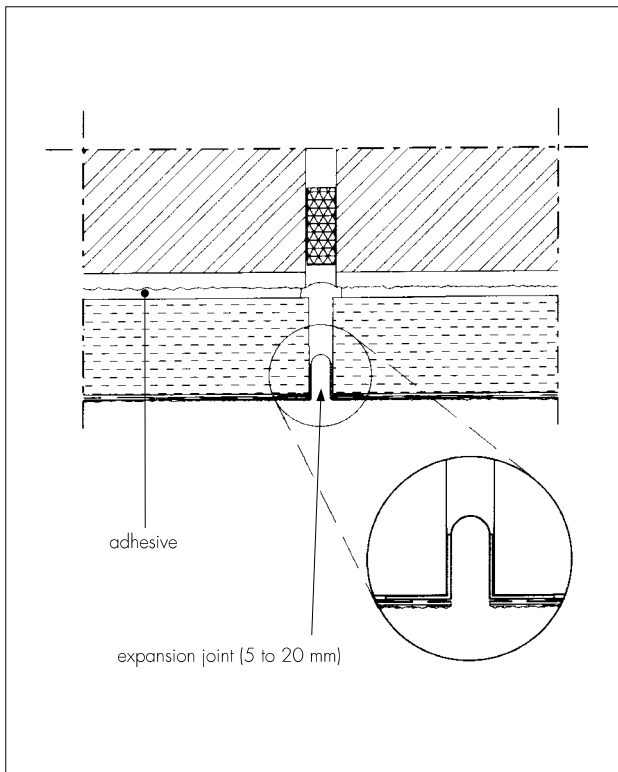
Movement joints

8.14 Generally, movement joints are not required in the system but, if an expansion joint is incorporated in the substrate, so a movement joint must be provided in the insulation system.

8.15 Where required, the movement joints extend through the full insulation system and are made with the use of Sto profiles E or V (see Figures 4 and 5), or sealed with an approved expansion joint sealant against a backer rod.

8.16 The movement joint sealant must not come into direct contact with the insulation slab. Therefore it is essential to ensure that the reinforcement mesh and the base coat are taken round the complete edge of the insulation slab.

Figure 4 Vertical expansion joint type E



8.18 Sto Stollit, Silco and Silco MP are prepared in accordance with the STO AG/CCS Scotseal Ltd's Information Manual and are trowel-applied in thicknesses from 1.5 mm to 6 mm using a stainless steel trowel.

8.19 Sto spar-dash finish may be applied to Sto Silco MP. The coating must be at least 6 mm thick, with the 3 mm to 6 mm aggregate applied immediately after application, while the coating is still soft. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure a good bond is achieved.

8.20 The finish coats should be allowed to dry thoroughly before the Sto paints are applied to any features.

8.21 Continuous surfaces must be completed without a break, so the coatings must always be applied to a wet edge.

8.22 At the top of walls the insulation slabs must be protected by fitting under a soffit or similar projection and be sealed using Stoseal tape (see Figure 6).

Figure 5 Corner expansion joint type V

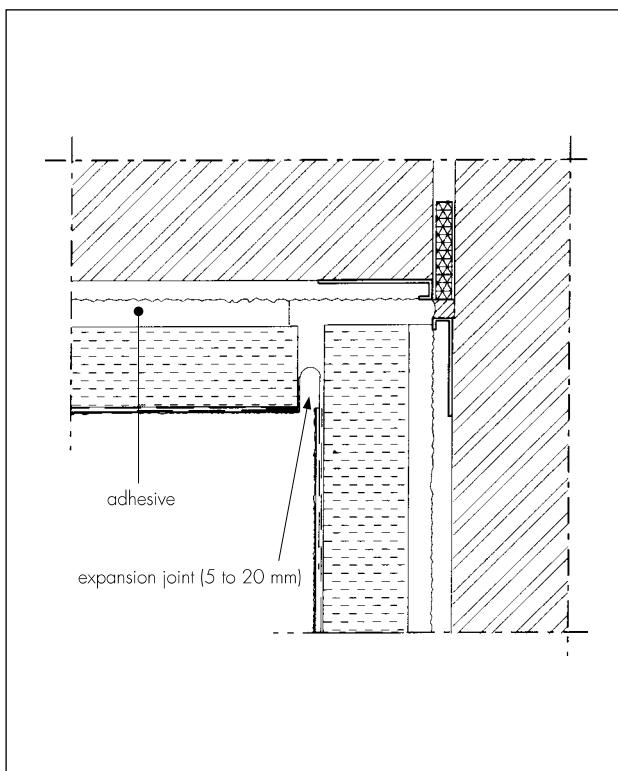
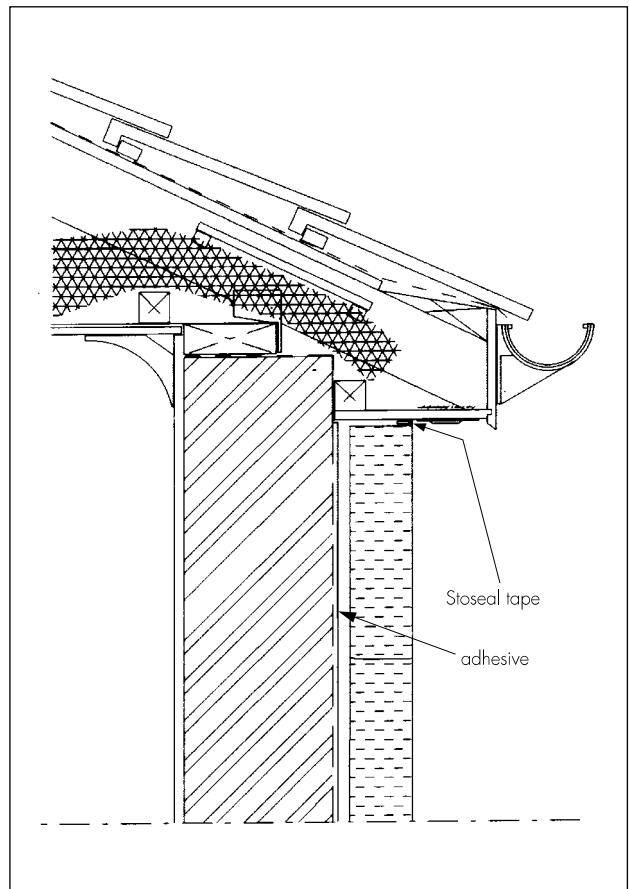


Figure 6 Eaves detail pitched roof



Finishing

8.17 The base coat should be left to dry thoroughly before application of the decorative finish. Depending on conditions the drying time should be between 24 hours and 48 hours. Sto primer coat is applied by brush or roller and allowed to dry prior to application of the decorative finish.

8.23 At windows and doors the insulation should be continued around the reveals where there is sufficient clearance. New buildings should be built to allow this. Where there is insufficient clearance the base coat, reinforcement mesh and render decorative finish should be continued into the

reveal. The insulation system must be sealed around window frames and sills to give an elastic joint using Stoseal tape or, in uninsulated reveals, Sto F 500 sealant (see Figures 7 and 8).

8.24 On completion external fittings are re-fixed to the substrate using suitable fixing pads previously installed in the system.

Figure 7 Insulated reveal

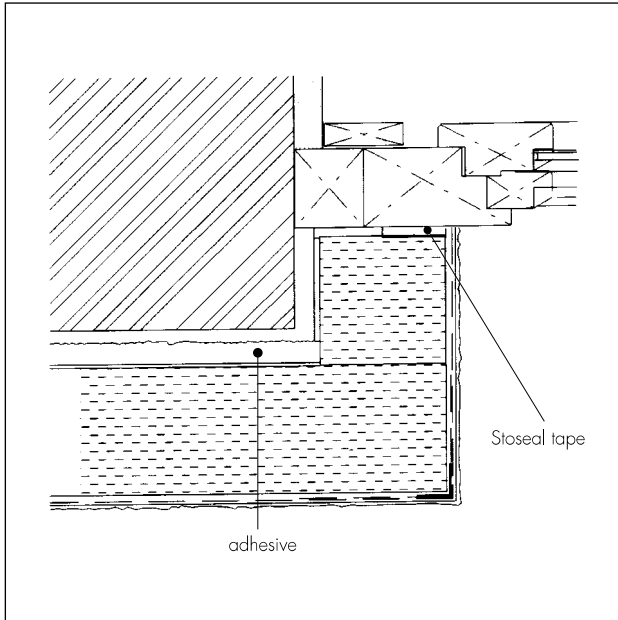
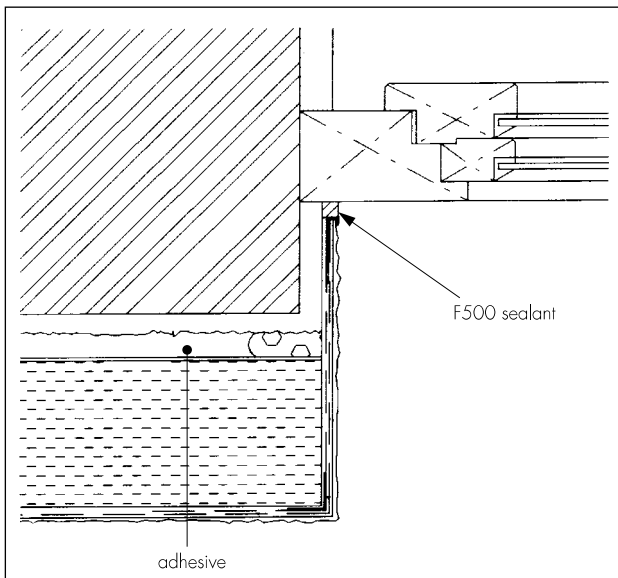


Figure 8 Uninsulated reveal



Technical Investigations

The following is a summary of the technical investigations carried out on the StoTherm Lamella External Wall Insulation System.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

- component characterisation
- heat/spray cycling
- resistance to freeze/thaw
- impact resistance
- water vapour permeability.

9.2 An examination was made of data relating to:

- fire propagation tests to BS 476 : Part 6 : 1989
- surface spread of flame tests to BS 476 : Part 7 : 1987
- pull-out strength of the system
- thermal conductivity to BS 874 : Part 2 : Section 2.1 : 1986.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 An assessment of the risk of interstitial condensation was undertaken.

10.3 Data generated from the assessment resulting in Certificates Nos 90/2433/C and 90/2460/C were used in support of this approval.

Bibliography

BS 476 *Fire tests on building materials and structures*
Part 4 : 1970(1984) *Non-combustibility test for materials*
Part 6 : 1989 *Method of test for fire propagation for products*
Part 7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulating properties*
Part 2 *Tests for thermal conductivity and related properties*
Section 2.1 : 1986 *Guarded hot-plate method*

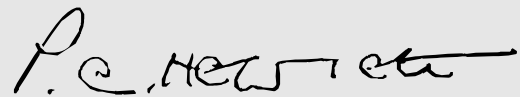
CP 3 *Code of basic data for the design of buildings*
Chapter V *Loading*
Part 2 : 1972 *Wind loads*

MOAT No 22 : 1988 *UEAtc Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*



On behalf of the British Board of Agrément

Date of issue: 9th October 1996



Director

1 Summary

Insulation

Sto Lamella Insulation Slabs — 1000 mm by 200 mm in a range of thicknesses from 40 mm to 200 mm, with a nominal density of 95 kgm⁻³.

Adhesive

Sto Levell-Uni — a polymer-based powder containing cement — mixed with water.

Reinforcement

Mesh of multi-stranded, alkali-resistant glass fibres with a polymer coating — nominal weight of 150 gm⁻².

Base coat

Sto Levell-Uni — a polymer-based powder containing cement — mixed with water.

Sto primer coat — an acrylate copolymer based primer used as a bonding agent and pre-coat to control suction.

Finishes

Sto Stolit, Silco and Silco MP — ready mixed, acrylic/silicone-based, textured coatings.

2 Thermal properties

Thermal conductivity of insulation slabs

0.040 Wm⁻¹K⁻¹.

U values

Using values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 1991 (as amended 1994) (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm⁻³) with 10 mm plasterboard:

Insulation
thickness
(mm)

U-value
(Wm⁻²K⁻¹)

40	0.62
50	0.54
60	0.47
70	0.42
100	0.32
120	0.28
150	0.23
200	0.18

3 Impact resistance

The system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings, walls of communal dwellings above ground floor. In other situations, eg walls of public buildings, at ground-floor level, combined heavy duty mesh and base coat plus standard mesh and second base coat is required to increase the resistance to impact.

4 Properties in relation to fire

The system is classified Class 0 as defined in the appropriate Building Regulations.

5 Design wind loading and resistance to wind suction

Using CP 3 : Chapter V : Part 2 : 1972, the system can be designed to withstand all expected suction wind loadings.

6 Durability

Age of oldest installation

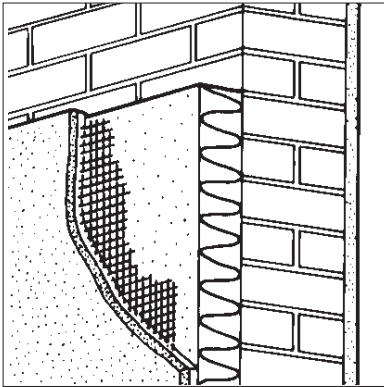
5 years in Germany.

Assessed life

30 years.

**STO EXTERNAL WALL INSULATION SYSTEMS
(BBA CERTIFICATE No 95/3132)
IRISH BUILDING REGULATIONS STATEMENT**

Second issue*



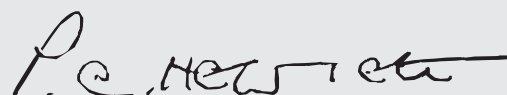
- THIS STATEMENT RELATES TO STO EXTERNAL WALL INSULATION SYSTEMS AND SETS OUT THE OPINION OF THE BBA ON THE POSITION OF THE PRODUCT UNDER THE BUILDING REGULATIONS IN THE REPUBLIC OF IRELAND.
- It must be read in conjunction with the Front Sheets and relevant Detail Sheets of Certificate No 95/3132.
- It will remain valid provided BBA Certificate No 95/3132 is valid.

The Building Regulations 1997/2000 Ireland

In the opinion of the BBA, Sto External Wall Insulation Systems, if used in accordance with the provisions of Certificate No 95/3132, will satisfy or contribute to satisfying the relevant requirements.

Requirement:	B4	External fire spread
Comment:		The systems are Class 0 and therefore meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets to BBA Certificate No 95/3132.
Requirement:	C4	Resistance to weather and ground moisture
Comment:		Walls insulated with the systems will meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets to BBA Certificate No 95/3132.
Requirement:	D1	Materials and workmanship
Comment:		The systems are acceptable. See the marked sections of the appropriate accompanying Detail Sheets to BBA Certificate No 95/3132.
Requirement:	L1	Conservation of fuel and energy — Limitation of heat loss through the building fabric
Comment:		The systems will enable, or contribute to enabling, a wall to meet the U value Requirement. See the marked sections of the appropriate accompanying Detail Sheets to BBA Certificate No 95/3132.

On behalf of the British Board of Agrément



Date of Second issue: 20th December 2002

Chief Executive

*Original Statement issued 22nd January 2002. This version includes revised Regulation title and cross references.